IDENTIFICATION OF DIFFERENT TERRAINS USING OPTICAL ENCODERS IN A MOBILE ROBOT

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Abstract

This research is mainly focused on identifying terrains for autonomous mobile robot navigation. When compared with other terrain identification researches this is a fully sensor based practical approach for terrain identification with a mobile robot named 'Rl '. For the robotic navigation the terrain behavior is one of the most important factors to reach the target without any failure. The results obtained from this research can be used to develop the intelligence of the robot controller board to adapt according to the terrain environment.

An experimental study has been carried out for the system US111gRl mobile robot by traveling various kinds of real terrains and collecting data online via a wireless data link.

The performance of autonomous navigation improves when the vehicle's control system takes into account the type of terrain on which the vehicle is traveling. For example, if the ground is covered with sand, a reduction of acceleration is necessary to avoid wheel slip. So many researchers have developed. algorithms based on vision and digital signal - processing (DSP) to categorize the traversability of the terrain. Others have used classical terramechanics equations to identify the key terrain parameters.

This thesis presents a statistical algorithm that uses the vehicle's internal sensors to qualitatively categorize the terrain type. in real-time. The algorithm was successful identifying carpet, cement, gravel, sand and grass terrains.